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REMARKS

The applicant's invention as claimed herein is specifically directed to providing a galvanometer scanner that has an extended useful life, higher axial and radial precision, and higher acceleration potential through the use of the recited ball bearing assemblies and thermally matched shaft and stator. The problem with galvanometers and similar reciprocating type precision rotary devices is expressed in detail in the Applicant's background section. Among the problems, as described on page 5, third paragraph, axial or radial springingness or imprecision may be tolerated until parts achieve operating temperature.

Closer tolerances and greater precision of shaft support bearings, as compared to the looser tolerances of other rotary devices and applications, is already understood in the art to be a necessary requirement of these small, precision, reciprocating rotary devices. As is further understood in the art, this precision extends to axial as well as radial precision of the shaft support within the housing. This is why skilled practitioners use bearing balls and ellipsoidal raceways rigidly affixed to their respect support members in galvanometers, rather than, for example, roller bearing assemblies that emphasis only radial precision.

This dual mode of desired radial and axial precision is further enhanced by this invention's all ceramic ball bearing assembly components *and* shaft and housing components all being thermally consistent. The claimed invention also offers longer useful life and higher acceleration potential over other galvanometer scanner designs. The benefits of such a galvanometer scanner are explained, for example, at page 9, paragraph 4, and page 10. paragraph 2.

The claims as herein amended are restricted to a galvanometer scanner with a shaft supported within a stator by unlubricated, all ceramic ball bearing assemblies; all these components having a common coefficient of thermal expansion, as is amply supported in the specification. This device has not heretofore been described in the art or used in the industry so far as is known to this Applicant.

Plesko, Stangeland, and Braunagel have been asserted as 103(a) rejections by the office against prior claims; Plesko and Stangeland in particular against prior claims 5-7.

Of these, only the Plesko device is associated with galvanometers at all, and its reference to bearings is nondescript at best, offering no insight as to bearing limitations or improvements or overall thermal considerations with respect to galvanometer performance, precision, and useful life. The Braunagel patent discloses a roller bearing, a style of bearing incompatible with and inapplicable to galvanometer scanner applications, not properly associated with Plesko in this context. The Stangeland patent likewise discloses a bearing assembly not associated with galvanometers. It describes having thermally compatible bearing components but not all ceramic components, not all bearing components specifically matched to the shaft and housing components, and not suitable for a galvanometer in its illustrated embodiments of roller bearings or ball bearings with less than full ellipsoidal contact raceways.

Applicant respectfully requests consideration of the claims as amended, noting the amendments to independent claim 5, for which there is antecedent basis at page 11, lines 6 and 7, for "non-lubricated ceramic bearings", and at page 10, line 4, for "all ceramic ball bearing assemblies". The "ellipsoidal" races of claims 6 and 9 have antecedent basis at page 9, paragraph 3. Improved acceleration, re claims 18-20, is supported at page 9, paragraph 4. No new matter is added.